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## Heavy metal Pb stress on germination and growth of 5 clover varieties

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**Key words :** clover, variety, heavy metal Pb, germination, growth

**Introduction** There are more than 360 species of clover all over the world. Cultispecies such as *Trifolium repens*, *Trifolium pratense* and etc. were widely used nowadays. Clover was not only used as forage, but also used as green manures (Carmela Bahiyyih et al., 2005). As the problem of heavy metals contaminating soil is more and more seriously, the plant growth characteristics with heavy metals stress were studied by more and more people. This paper describes the germination and growth of 5 clover varieties with heavy metals Pb stress.

**Materials and methods** The germination experiment treatments applied were: 5 concentrations of Pb (0mg/kg, 200mg/kg, 600mg/kg, 1000mg/kg, 1200 mg/kg) as the form of  $C_4H_6O_4Pb$  solution was used to water the seeds when the papers run short of water. The seeds, packed in paper, were stored in the greenhouse (28°C average temperature). Every paper consisted of 100 seeds. Results were recorded 10 days after planting. In the pot-cultured experiment, more than 10 clover seeds, packed in a pot, were stored in the greenhouse. The mixture of 4 kg soil and 45 g manures were put into a pot to feed the seeds. 5 seedlings were remained in every pot when the clover sprouted and grew well. 5 different concentrations of Pb as former were used to water the soil when the clover was in its branching stage. Leaf area (determined with a CI-202 leaf-area meter), plant height and overground biomass (fresh weight) was recorded when clover was in its early flowering stage. All the experiment was arranged in randomized blocks with 3 replications.

**Results** Clover's germination rate, radicle length, leaf area, plant height and overground biomass were reduced by the increasing of concentration of heavy metal Pb. Different clover varieties had variable germination rate and a downward trend in germination rate of 5 clover varieties (Figure 1). The seedling radicle length, leaf area, plant height and overground biomass when concentrations of Pb was 1000mg/kg and 1200 mg/kg were significantly lower than it was when concentration of Pb was 0mg/kg (Figure 1).

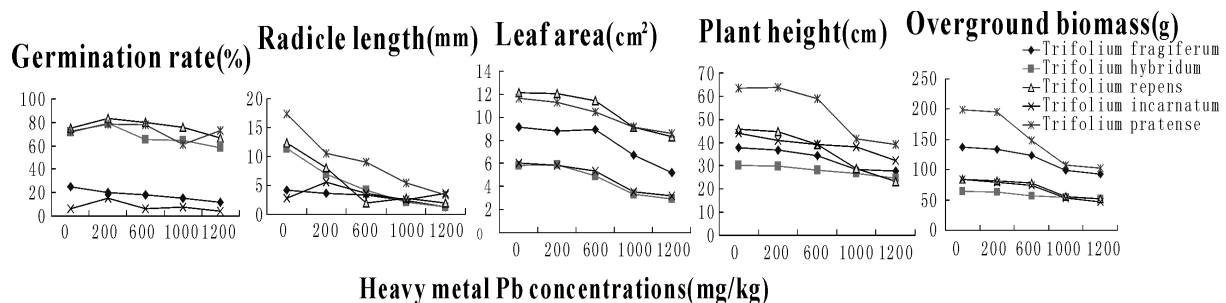


Figure 1 Effect of heavy metal Pb stress on germination and growth characteristics of 5 clover varieties.

**Conclusions** Heavy metal Pb stress has a strong influence on the germination and growth characteristics of 5 clover varieties. Varietal differences in clover with heavy metal Pb stress. The germination of *Trifolium incarnatum* affected little by heavy metal Pb stress (Figure 1). Low level heavy metal Pb concentrations have little influence on the germination and growth characteristics of 5 clover varieties. But a significant downward trend in radicle length, leaf area, plant height and overground biomass was made by the increasing of heavy metal Pb concentrations.

### Reference

Carmela Bahiyyih M. Arevalo, Allan P. Drew, Timothy A. Volk (2005). The effect of common Dutch white clover (*Trifolium repens* L.), as a green manure, on biomass production, allometric growth and foliar nitrogen of two willow clones. *Biomass and Bioenergy*, 22-31.